

# 1) Choose the best answer or answers:

1) Which of the following cant not be used as vector?

- a) phage      b) plasmids      c) bacterium      d) all can be used
- c)

2) With regard to DNA structures

- a) Adenine (A) and guanine (G) are purine bases  
b) Guanine (G) always pairs with thymidine (T) and adenine (A) with cytosine (C)  
c) There are 65 possible codons  
d) Each amino acid may be coded by more than one codon

a)

3) Cutting certain genes out of molecules of DNA requires the use of special

A)degrading nucleases. B) restriction endonucleases. C) eukaryotic enzymes. D) viral enzymes.

b)

4) PCR is used to detect

- a) viral protein antigen      b) viral genome      c) viral particles      d) viral envelope

b

5) DNA polymerase III can only add nucleotides to an existing chain, so \_\_\_\_\_ is required.

- a). an RNA primer  
b). DNA polymerase I  
c). helicase  
d). a DNA primer

a)

6) The enzyme used in the polymerase chain reaction is

- a) Restriction endonuclease      b) Reverse transcriptase  
c) DNA polymerase      d) RNA polymerase

c

7) Okazaki fragments are

- a). synthesized in the 3' to 5' direction.  
b). found on the lagging strand.  
c). found on the leading strand.  
d). assembled as continuous replication.

b)

**8) DNA library is**

- a) A general collection of all genes sequenced thus far.
- b) All DNA fragments identified with a probe.
- c) A collection of DNA fragments that make up the entire genome of a particular organism.
- d) A DNA fragment inserted into a vector.

C

**9) A probe is used in which stage of genetic engineering?**

- a) Cloning.
- b) Screening.
- c) Cleaving DNA.
- d) Recombining DNA.

b

**10) The method used to distinguish DNA of one individual from another is**

- a) Polymerase chain reaction.
- b) cDNA.
- c) Restriction fragment length polymorphism.
- d) Reverse transcriptase.

C (profiling)

**11) DNA is unwound by**

- a) DNA polymerase III
- b) RNA primase
- c) DNA polymerase I
- d) Helicase
- e) DNA ligase

d)

**12) Which of the following processes contribute to the appearance of mutations in genes?**

- a) Chemicals that damage bases.
- b) Mistakes made by the DNA polymerase during replication.
- c) Movement of transposons around the genome.
- d) Formation of deletions indirectly repeated DNA sequences.
- e) All of the above.

e)

13) Which property(ies) or structure(s) is (are) shared by all extrachromosomal plasmids in bacteria?

- a) Self-transmissibility from one bacterial cell to another
- b) Genes that impart resistance to antibiotics
- c) Genes that allow utilization of organic compounds
- d) An origin for autonomous replication

D

14) The process by which bacteriophage P1 packages random phage-genome-sized pieces into phage heads and thereby allows transfer of pieces of the bacterial chromosomal DNA between bacteria is called:

- a) Generalized transduction.
- b) Non-general transposition.
- c) Specialized transduction.
- d) High-frequency recombination.
- e) Reverse conjugation.

A

15) Which of the following are causes of inheritable mutations in bacteria?

- a) Mistakes during translation of mRNA.
- b) Mistakes during DNA replication.
- c) Mistakes during transcription of mRNA.
- d) All of the above.
- e) None of the above.

b

16) Transformation is important in bacterial pathogenicity because:

- a) It allows uptake of DNA that can homologously recombine into the bacterial chromosome and change virulence characteristics.
- b) It kills recipient cells and prevents future cell invasion.
- c) It enhances site-specific recombination that turns on virulence factor genes.
- d) It causes transpositions to occur at high frequency that can kill virulent bacteria.

a

17) Transformation is the genetic process by which:

- a) bacteriophage attach to bacterial cells.
- b) pieces of free DNA or free plasmids are taken up by bacterial cells.
- c) bacterial genes acquire mutations and variants.
- d) bacterial DNA is carried by bacteriophage between different bacteria.
- e) none of the above.

b

18) Plasmids are important to the genetics of many bacteria because:

- a) they are inherited from one generation to the next
- b) They may carry genes that give their host a selective advantage
- c) They can render bacteria drug resistance
- d) All of the above

D

19) Which of the following best describes what happens during DNA replication, after strands of original DNA molecule have separated:

- a) Nucleotides line up against the complementary nucleotides on both strands.
- b) New DNA molecules line up against both strands.
- c) Nucleotides line up against the complementary nucleotides on one strands.
- d) New DNA molecules line up against one strands.

a

20) Which of the following processes doesn't occur in DNA replication?

- a) Hydrogen bonds break
- b) Polynucleotide chains are formed
- c) Condensation
- d) mRNA nucleotides line up against the coding strand of DNA

d

21) Gene probes are often radioactive. This enables them to

- a) be located easily
- b) bind to another piece of DNA
- c) be separated from other pieces of DNA by electrophoresis.
- d) Be inserted into vectors

a

22) The coding strand for a piece of DNA has the following sequence of bases ATCAGTCCT. Which of the following sequences represents a single base substitution

- a) TCAGTCCT      B) TTCAGTCCA      C) TTCAGTCCT      D) TAGTCAGGA

c

23) A virus can be used to transfer a gene into another organism because this virus is an example of

- a) Clone                      b) plasmid                      c) marker                      d) vector

d

24) If we know how many thymine bases there are in a piece of DNA, we can calculate the number of which of the following bases:

- a) Adenine                      b) cytosine                      c) guanine                      d) uracil

a

25) A mutation that occurs when a mutagen causes permanent change in DNA is

- a) Inversion b) deletion c) duplication d) induced mutation e) translocation

d

26) The main difference between DNA and RNA that:

- a) RNA lacks pyrimidine bases  
b) DNA lacks purine bases  
c) DNA lacks 2' hydroxyl group  
d) RNA lacks 2' hydroxyl group

c

27) A mutation that arises from a single base change in a codon -----  
the amino acid coded for

- a) Will change  
b) Will not change  
c) May or may not change  
d) Will be repaired, so that it will have no effect on  
e) None of the above

c

28) Which of the following is not a characteristic of RNA

- a) RNA contains uracil as a base  
b) The sugar molecule in RNA is ribose  
c) RNA can base pair with DNA  
d) RNA consists of a single polynucleotide strand  
e) RNA contains more bases than DNA

E

29) Which of the following is not a phase that occurs during transcription:

- a) Termination b) initiation c) conjugation d) elongation e) all of these occur

c

30) Which of the following is a stop codon

- a) UAA      b) UGC      c) UAC      d) UUA      e) UGG

a

31) Which of the following about the genetic code is true?

- a) It is degenerate
- b) It changes a great deal over a short period of time
- c) It is ambiguous
- d) It has 64 codon that code for amino acids
- e) It is completely different for prokaryotes and eukaryotes

a

32) Which of the following is a function of tRNA?

- a) It is the main constituent of ribosomes
- b) It transports amino acids
- c) It acts as a template for translation
- d) It recognizes 4 bases on mRNA
- e) tRNAs all carry the same anticodon

b

33) Which of the following statements about plasmids is true?

- a) Plasmids are viruses
- b) In plasmids, R factors encode the genes needed for conjugation
- c) Plasmids are tiny bacteria
- d) In plasmids, F factor may confer resistance to antibiotics
- e) Plasmids can move between cells during conjugation

E

34) Which of these factors are associated with DNA damage

- a) Alkylating agents      b) UV      c) free radicals      d) all of these

d

35) If a part of a chromosome breaks and reattaches to another chromosome it is known as

- a) Translocation      b) hybridization      c) amplification      d) splicing

a

36) What type of mutation doesn't change the sequence of gene product?

- a) Silent      b) non sense      c) non coding      d) quiescent

a

37) Mutation and DNA damage can be repaired by the cell. Which of the following is not a type of DNA repair?

- a) Specific exclusion repair  
b) Direct repair  
c) Nucleotide excision repair  
d) Mis-match repair

a

38) What is the consequence of non sense mutation?

- a) Prevents DNA replication  
b) Codes for the wrong amino acid  
c) Deletes promoter region  
d) Introduces a stop codon

d

39) Why are non sense mutations rare?

- a) They only occur in certain types of DNA  
b) Because their effect on survival is great  
c) DNA repair mechanisms easily spot this type of mutation  
d) Their presence prevent DNA replication

b

40) Which is not a base of DNA?

- a) Nucleotide      b) adenine      c) thymine      d) cytosine

a



41) What is genetic mutation?

- a) DNA complication
- b) Mutations that occur only in egg or sperm cell
- c) Any alteration in the inherited nucleic acid sequence of the genotype

c

42) What is a disease caused by a defect in protein hemoglobin?

- a) Poly ploidy
- b) sickle cell anemia
- c) tRNA
- d) hemophilia

b

43) In a sample of double stranded DNA from a human, you have determined that 20 percent nitrogenous base is adenine. What percentage should be cytosine?

- a) 15
- b) 30
- c) 70
- d) 35
- e) 40

b

44) **Genes that produce toxins** Transformation is important in bacterial pathogenicity because:

- e) It allows uptake of DNA that can homologously recombine into the bacterial chromosome and change virulence characteristics.
- f) It kills recipient cells and prevents future cell invasion.
- g) It enhances site-specific recombination that turns on virulence factor genes.
- h) It causes transpositions to occur at high frequency that can kill virulent bacteria.

a)

45) Transformation is the genetic process by which:

- f) bacteriophage attach to bacterial cells.
- g) pieces of free DNA or free plasmids are taken up by bacterial cells.
- h) bacterial genes acquire mutations and variants.
- i) bacterial DNA is carried by bacteriophage between different bacteria.
- j) none of the above.

b)

46) Which of the following is the correct order in which a charged tRNA travels?

- a) P site; A site ; E site
- b) E site ; P site ; A site
- c) A site; P site; E site

c)

47) Which of the following processes contribute to the appearance of mutations in genes?

- a. Chemicals that damage bases.
- b. Movement of transposons around the genome.
- c. Mistakes made by the DNA polymerase during replication.
- d. All of the above.

d)

48) A base analog is a chemical that:

- a. Converts one base to another by altering amino groups to hydroxy groups
- b. Hydrolyses pyrimidine bases off from the deoxyribose to which they were attached
- c. Distorts a DNA double helix by binding to base pairs
- d. Is mistakenly incorporated into DNA by DNA polymerase
- e. Absorbs ultraviolet radiation and reacts with DNA

d

49) The Ames test for detecting mutations relies on:

- a. Producing mutants of bacteria that are resistant to mutagens
- b. Reversion of mutant bacteria that cannot make histidine
- c. The fact that all common mutagens cause the same type of defects at the molecular level
- d. The splitting of thymine dimers by ultraviolet radiation,

b

50) DNA differs from RNA in that DNA:

- a. Contains uracil and RNA does not
- b. Is present in the cytosol and RNA is not
- c. Contains deoxyribose
- d. Is often double-stranded
- e. Both c and d

e

51) How many different ways can three of the four bases A, C, G and T be combined?

- a) 12
- b) 16
- c) 20
- d) 64

d)

52) Which of the following statements is not true? A gene:

- a) is a piece of DNA which codes for protein.

- b) Is made up of a sequence of nucleotides
  - c) Can be affected by mutation
  - d) Is a sequence of bases which codes for an amino acid
- d)

## Complete:

- \* DNA replication proceeds by poly nucleotide chain elongation by the addition of nucleotides in the .....direction  
5' to 3'
- \* .....are enzymes that disrupt .....in the DNA helix.  
Helicases – hydrogen bonds
- \* The gene transfer from one cell to another related cell by sex pilli is called.....  
conjugation
- \* Mutation is ..... And its types are.....  
Any alteration in the normal sequence of DNA- single base (substitution- frame shift) or chromosomal
- \* Cutting certain genes out of molecules of DNA requires the use of special.....  
Restriction endonuclease enzymes
- \* The organelle in the cells where proteins are made from amino acids is called....  
Ribosome
- \* Anything that can damage or cause changes in DNA is called a.....  
Mutagen
- \* The antisense DNA strand that complements mRNA AUGCGAGAC is.....  
TACGCTCTG
- \* Generalized transduction differs from specialized in that.....  
The type of bacteriophage (lytic for generalized and lysogenic for specialized)
- \* Frame shift mutations are caused by.....or.....and result in.....or.....  
Deletion or insertion – short polypeptide or long polypeptide

## true or false:

- \* Non sense mutation causes the wrong amino acid to be incorporated into the mutant protein (f)
- \* DNA ligase links Okazaki fragments together in DNA replication. (T)
- \* Reverse Transcriptase is used to produce ssDNA from mRNA (T)
- \* DNA replication is semi conservative because the template parent strand is retained by the daughter molecules. (T)
- \* mRNA is formed by translation of a gene on one unzipped DNA strand. (F)
- \* tRNA carries the anticodon and amino acids to the ribosome for protein synthesis. (T)
- \* A mutation is an inheritable change in the DNA code. (T)

- \* A plasmid is a circular piece of DNA that is needed for normal function of bacteria. (F)
- \* Transduction is a form of intermicrobial gene transfer that involves a virus carrier. (T)
- \* Exchange of genetic material in bacteria is unidirectional from donor to recipient. (T)
- \* A genetic mutation always causes the production of a different protein. (F)
- \* Point mutation in a chromosome involve changes to single bases. (T)